

**REMARKS**

Claims 1-11 are pending in the present application.

The Examiner has required election in the present application between:

Group I, claims 1-6, drawn to a heat-peelable pressure-sensitive adhesive sheet;

Group II, claims 7-9, drawn to a method of processing an adherend;

Group III, claim 10, drawn to an electronic component; and

Group IV, claim 11, drawn to a semiconductor component.

**For the purpose of examination of the present application, Applicants respectfully elect, with traverse, Group I, Claims 1-6.**

Also, Applicants respectfully submit that it is improper for the Examiner to restrict Group I directed to claims 1-6. In particular, Applicants hereby request rejoinder of Group II directed to claims 7-9, Group III directed to claim 10 and Group IV directed to claim 11. Whereas claims 1-6 are drawn to a heat-peelable pressure-sensitive adhesive sheet, claims 7-9 are directed to a method of processing an adherend by applying the heat-peelable pressure-sensitive adhesive sheet of claims 1-6 to the adherend, claim 10 is directed to an electronic component produced using the method of processing an adherend of claim 8, and claim 11 is directed to a semiconductor component produced using the method of processing an adherend of claim 9. Therefore, Groups I, II, III and IV have a common heat-peelable pressure-sensitive adhesive sheet.

In this respect, the Examiner has asserted that since special technical features linking Group I-IV inventions, i.e., the heat-peelable pressure-sensitive adhesive sheet do not provide a contribution over the US Publication 2004/0003883 (hereinafter US '883), no single general inventive concept exists under PCT rule 13.1.

Applicants respectfully disagree with the Examiner's application of a lack of unity of invention for at least the following reasons.

**First**, the present invention is not obvious over US '883.

*The Present Invention and its Advantages*

An object of the present invention is to provide a heat-peelable pressure-sensitive adhesive sheet, which is used in the production of electronic components and semiconductor components. The present heat-peelable pressure-sensitive adhesive sheet prevents deformation of the pressure-sensitive adhesive layer as a result of pressurization during the pressing process and exhibits excellent tackiness so as to prevent misregistration of adherends during the laminating and cutting processes in the production of electronic components. The present adhesive sheet can also exhibit excellent tackiness and realize further reduced chipping during the grinding and cutting processes in the production of semiconductor components and can be easily peeled off from an adherend (processed article) after processing. Further, the claimed adhesive sheet, if used as a pressure-sensitive adhesive tape, can easily adhere to an adherend at ordinary temperature.

Another object of the present invention is to provide a method for processing an adherend using the heat-peelable pressure-sensitive adhesive sheet.

Yet another object of the present invention is to provide a heat-peelable pressure-sensitive adhesive sheet that can contribute to improvement in component precision, reduction in size of the adherend, and improvement in yield to thereby effectively improve the productivity.

To accomplish these objects, claim 1 of the present invention provides a heat-peelable pressure-sensitive adhesive sheet comprising a substrate; and a heat-expandable pressure-sensitive adhesive layer arranged on or above at least one side of the substrate, the heat-expandable pressure-sensitive adhesive layer containing a foaming agent and having a shear modulus (23°C) in an unfoamed state of  $7 \times 10^6$  Pa or more, wherein the adhesive sheet further comprises a pressure-sensitive adhesive layer being arranged on or above the heat-expandable pressure-sensitive adhesive layer and having a shear modulus (23°C) of less than  $7 \times 10^6$  Pa (claim 1).

In the claimed adhesive sheet, a shear modulus ( $7 \times 10^6$  Pa or more) at 23°C of *the heat-expandable pressure-sensitive adhesive layer* is higher than a shear modulus (less than  $7 \times 10^6$  Pa) of the pressure-sensitive adhesive layer being arranged on or above *the heat-expandable pressure-sensitive adhesive layer*. In other words, the present invention focuses on employing *the heat-expandable pressure-sensitive adhesive layer* and pressure-sensitive adhesive layer, each having different shear modulus at 23 °C.

Specifically, in the present Examples 1 and 2, *a maleic acid-modified styrene-ethylene-butylene-styrene block copolymer* is used as the base polymer of *the heat-expandable pressure-sensitive adhesive layer*. Here, the shear modulus at 23°C is  $2.3 \times 10^7$  Pa (Example 1) or  $5 \times 10^7$  Pa (Example 2). See Table 1 of the present specification. Therefore, when *an acrylic copolymer* is used as the base polymer of the pressure-sensitive adhesive layer being arranged on or above *the heat-expandable pressure-sensitive adhesive layer*, the resulting heat-peelable pressure-sensitive adhesive sheets according to Examples 1 and 2 can be easily and firmly applied to an adherend at ordinary temperature such as room temperature of 23°C as with regular pressure-sensitive adhesive tapes (see Table 1).

#### Distinctions over US '883

US '883 relates to an energy-beam-curable thermo-expandable viscoelastic layer 2 (*the heat-expandable pressure-sensitive adhesive layer*) containing an energy-beam-curable compound (or energy-beam-curable resin) for imparting the layer with energy beam curability (paragraph [0017]), and the layer 2 can be cured before cutting by an irradiation to prevent chipping.

However, the pressure-sensitive adhesive sheet of US '883 differs from the claimed adhesive sheet since US '883 remains silent about making the shear modulus (23°C) of *the heat-expandable pressure-sensitive adhesive layer* higher than that of the pressure-sensitive adhesive layer being arranged on or above *the heat-expandable pressure-sensitive adhesive layer*. Rather, US '883 simply discloses a shear modulus of  $1 \times 10^5$  to  $5 \times 10^7$  Pa or more of *the heat-expandable pressure-sensitive adhesive layer* only.

Specifically, Examples 1 and 2 of US '883 use the same acrylic copolymer for both the base polymer of *the heat-expandable pressure-sensitive adhesive layer* and the pressure-sensitive adhesive layer being arranged on or above. From this fact, in US '883, the shear modulus (23°C) for both layers is similar to each other.

Further, an object of US '883 is to provide a sheet which is reduced in contamination on the adherend after being released from the sheet (paragraph [0005] of US '883). Therefore, Applicants respectfully submit that a high shear modulus (23°C) for the pressure-sensitive adhesive layer as compared to *the heat-expandable pressure-sensitive adhesive layer* is rather preferable in US '883.

In summary, US '883 fails to disclose or suggest making a shear modulus (23°C) of *the heat-expandable pressure-sensitive adhesive layer* be higher than that of the pressure-sensitive adhesive layer being arranged on or above *the heat-expandable pressure-sensitive adhesive layer*. Thus, the claimed invention directed the heat-peelable pressure-sensitive adhesive sheet comprising *a heat-expandable pressure-sensitive adhesive layer* having a shear modulus (23°C) of  $7 \times 10^6$  Pa or more, preferably  $1 \times 10^7$  Pa or more; and a pressure-sensitive adhesive layer being arranged on or above *the heat-expandable pressure-sensitive adhesive layer* and having a shear modulus (23°C) of less than  $7 \times 10^6$  Pa would not have been anticipated by or obvious over US '883.

Accordingly, since the heat-peelable pressure-sensitive adhesive sheet of the present invention is neither anticipated by nor obvious over by US '883, the special technical feature linking four inventions, a heat-peelable pressure-sensitive adhesive sheet, provides a contribution over the prior art; and a single general inventive concept exists.

**Second**, according to MPEP § 803, if the search and examination of an entire application can be made without a serious burden, the Examiner *must* examine it on the merits, even though it includes claims to independent or distinct inventions.

Since Group I (claims 1-6, directed to a heat-peelable pressure-sensitive adhesive sheet), Group II (claims 7-9, directed to a method of processing an adherend), Group III (claim 10, directed to an electronic component produced by the method of claim 8); and Group IV (claim

11, directed to a semiconductor component produced by the method of claim 9) are so closely related in subject matter, by searching one feature (heat-peelable pressure-sensitive adhesive sheet), the Examiner is necessarily searching the other features such as its use (processing method) and the product involving heat-peelable pressure-sensitive adhesive sheet.

**Third**, according to MPEP § 1850, Determination of "Unity of Invention", with respect to a group of inventions claimed in an international application, unity of invention exists only when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding special technical features. Unity of invention has to be considered in the first place only in relation to the independent claims in an international application and not the dependent claims.

Independent claim 1 involves a heat-peelable pressure-sensitive adhesive sheet which is useful as applying to an adherend. Claims 7-11 that are being restricted from Group I are all dependent directly or indirectly upon claim 1 of Group I and are methods and product that involve the heat-peelable pressure-sensitive adhesive sheet of claim 1.

In light of the above arguments, there is unity of invention within the claims since they are based upon the heat-peelable pressure-sensitive adhesive sheet, its method of use, and the product produced by the method, all of which involve the heat-peelable pressure-sensitive adhesive sheet. Since there is this interrelationship within the claims, there is no undue burden to search all of claims 1-11.

As such, Applicants respectfully request that the Examiner rejoin Groups I-IV.

Reconsideration and withdrawal of the Unity of Invention Restriction Requirement of claims 1-11 are respectfully requested.

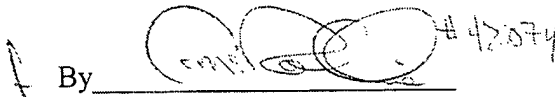
Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Gerald M. Murphy, Jr., Registration No 28,977 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

- ☐ Attached is a Petition for Extension of Time.
- ☐ Attached hereto is the fee transmittal listing the required fees.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to our Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17; particularly, extension of time fees.

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Respectfully submitted,

  
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